

9th Class 2021

Chemistry

Group-II

Paper-I

Time: 1.45 Hours (Subjective Type)

Marks: 48

(Part-I)

Q.2. Write short answers to any Five (5) questions: (10).

- (i) Differentiate between atomic number and mass number.

Ans

Atomic number	Mass number
1. The atomic number of an element is equal to the number of protons present in the nucleus of its atoms.	1. The mass number is the sum of number of protons and neutrons present in the nucleus of an atom.
2. It is represented by 'Z'.	2. It is represented by 'A'.

- (ii) What is the difference between physical and chemical properties? Give an example of each.

Ans

Physical Properties	Chemical Properties
The properties that are associated with the physical state of a matter are called physical properties; like colour, smell, taste, etc.	The chemical properties depend upon the composition of substance. When a substance undergoes a chemical change, its composition changes and a new substance is formed.

- (iii) Why ionic compounds have high melting and boiling points?

Ans

Ionic compounds have high melting and boiling points. For example, sodium chloride has melting point 800°C and a boiling point 1413°C . As ionic compounds are made up of positive and negative ions, there exist strong electrostatic forces of attraction between oppositely

charged ions. So, a great amount of energy is required to break these forces.

- (iv) Write down electronic configuration of aluminium according to shells and subshells.

Ans Electronic configuration of aluminium:

K	L	M
2	8	3

Further distribution of electrons in subshells is:

$1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

- (v) Differentiate between shell and subshell with examples.

Ans

Shell	Subshell
1. Shells are the main energy levels that electrons can occupy.	1. The number of subshells in a shell is equal to its n value.
2. K, L, M, N are shells.	2. s, p, d, f are subshells.

- (vi) Describe the trend of electronegativity in periodic table.

Ans The trend of electronegativity is same as of ionization energy and electron affinity. It increases in a period from left to right because higher Z_{eff} shortens distance from the nucleus of the shared pair of electrons. This enhances the power to attract the shared pair of electrons. For example, electronegativity values of period 2 are as follow:

2 nd period elements	³ Li	⁴ Be	⁵ B	⁶ C	⁷ N	⁸ O	⁹ F
Electronegativity	1.0	1.5	2.0	2.5	3.0	3.5	4.0

Table: Electronegativity increasing in a period.

It generally decreases down a group because size of the atom increases. Thus attraction for the shared pair of electrons weakens.

(vii) Define ionization energy.

Ans The ionization energy is the amount of energy required to remove the most loosely bound electron from the valence shell of an isolated gaseous atom.

(viii) Write two features of long form of periodic table.

Ans Two features of long form of periodic table are:

1. This table consists of seven horizontal rows called periods.
2. First period consists of only two elements. Second and third periods consist of 8 elements each. Fourth and fifth periods consist of 18 elements each. Sixth period has 32 elements while seventh period has 32 elements.

Q.3. Write short answers to any FIVE (5) questions: 10

(i) Define octet rule and duplet rule.

Ans This attaining of 8 electrons configuration in the outermost shell either by sharing, by losing or by gaining electrons, is called octet rule. This octet rule only symbolizes that noble gas electronic configuration should be attained by atoms when they combine or react. For elements like hydrogen or helium, which have only s-subshell, this becomes 'duplet' rule'. It plays a significant role in understanding the formation of chemical bond between atoms.

(ii) Define double covalent bond with one example.

Ans When each bonded atom contributes two electrons, two bond pairs are shared and a double covalent bond is formed. These bond pairs are indicated as double line between those atoms in the structure of such molecules. The molecules like oxygen (O_2) gas and ethene (C_2H_4) show such type of double covalent bonds.

(iii) What is hydrogen bonding?

Ans Partially positively charged hydrogen atom of one molecule attracts and forms a bond with the partially

negatively charged atom of the other molecule, the bonding is called hydrogen bonding.

(iv) What is absolute zero?

Ans Lord Kelvin introduced absolute temperature scale or Kelvin scale. This scale of temperature starts from 0 K or -273.15°C , which is given the name of absolute zero. It is the temperature at which an ideal gas would have zero volume.

(v) How intermolecular forces affects evaporation?

Ans Intermolecular forces:

If intermolecular forces are stronger, molecules face difficulty in evaporation. For example, water has stronger intermolecular forces than alcohol, therefore, alcohol evaporates faster than water.

(vi) Define aqueous solution with one example.

Ans The solution which is formed by dissolving a substance in water is called an aqueous solution. In aqueous solutions, water is always present in greater amount and termed as solvent. For example, sugar in water and table salt in water.

(vii) What is percentage-mass/volume (% m/v)? Write formula also.

Ans Percentage-mass / volume (%m/v):

It is the number of grams of solute dissolved in 100 cm^3 parts by volume of the solution. For example, 10% m/v sugar solution contains 10 g of sugar in 100 cm^3 of the solution. The exact volume of solvent is not mentioned or it is not known.

$$\% \text{ m/v} = \frac{\text{Mass of solute (g)}}{\text{Volume of solution (cm}^3\text{)}} \times 100$$

(viii) Define saturated and unsaturated solution.

Ans A solution containing maximum amount of solute at a given temperature is called saturated solution.

A solution which contains lesser amount of solute than that which is required to saturate it at a given temperature, is called unsaturated solution.

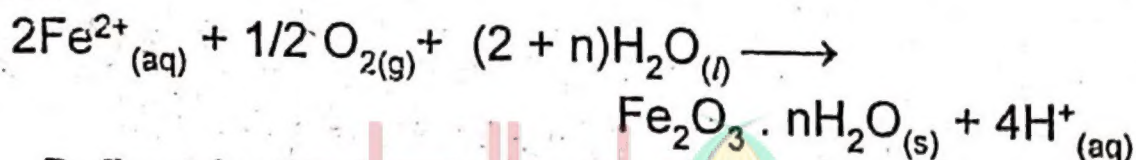
Q.4. Write short answers to any FIVE (5) questions: 10

(i) Define reducing agent.

Ans Reducing agent is the specie that reduces a substance by donating electron to it. The substance (atom or ion) which is oxidized by losing electrons is also called reducing agent. Almost all metals are good reducing agents because they have the tendency to lose electrons.

(ii) What is meant by rust?

Ans The Fe^{2+} formed spreads throughout the surrounding water and reacts with O_2 to form the salt $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ which is called rust. It is also a redox reaction.



(iii) Define electrochemical cell.

Ans Electrochemical cell is a system in which two electrodes are dipped in the solution of an electrolyte and are connected to the battery. Electrochemical cell is an energy storage device in which either a chemical reaction takes place by using electric current (electrolysis) or chemical reaction produces electric current (electric conductance).

(iv) What is meant by strong electrolytes? Give example.

Ans The electrolytes which ionize almost completely in their aqueous solutions and produce more ions, are called strong electrolytes. Example of strong electrolytes are aqueous solutions of NaCl , NaOH , H_2SO_4 , etc.

(v) Why is copper used for making electrical wires?

Ans Copper is a highly conduction metal. This means the electricity can pass through it with greater ease, making it

ideal for use in electrical wires. Copper is not just conductive, it's also ductile.

(vi) Define non-metals.

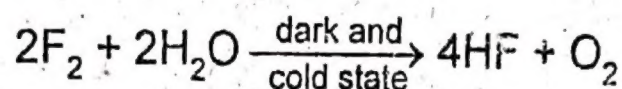
Ans Non-metals form negative ions (anions) by gaining electrons. In this way, non-metals are electronegative in nature and form acidic oxides.

(vii) What is meant by electropositivity?

Ans Metals have the tendency to lose their valance electrons. This property of a metal is termed as electropositivity or metallic character. The more easily a metal loses its electrons, the more electropositive it is.

(viii) Write down the reaction of fluorine with water.

Ans Fluorine (F_2) decomposes water in cold state and in dark.



(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) What were the results concluded by Rutherford in his experiment? (5)

Ans For Answer see Paper 2019 (Group-I), Q.5.(a).

(b) Define molecule and explain its types. (4)

Ans For Answer see Paper 2018 (Group-II), Q.5.(b).

Q.6.(a) Explain dipole-dipole interaction with example of HCl. (5)

Ans For Answer see Paper 2021 (Group-I), Q.6.(a).

(b) State Boyle's law and derive its equation. (4)

Ans For Answer see Paper 2016 (Group-II), Q.6.(b).

Q.7.(a) Define electroplating and explain the electroplating of chromium. (5)

Ans For Answer see Paper 2021 (Group-I), Q.7.(a).

(b) What is molarity? Write its formula and explain how one molar solution of sodium hydroxide (NaOH) is prepared? (4)

Ans Molarity:

"It is a concentration unit defined as Number of moles of solute dissolved in one dm^3 of the solution."

It is represented by M. Molarity is the unit mostly used in chemistry and allied sciences. The formula used for the preparation of molar solution is as follows:

$$\text{Molarity (M)} = \frac{\text{Mass of solute (g)}}{\text{Molar mass of solute (g mol}^{-1}\text{)} \times \text{Volume of solution (dm}^3\text{)}} = \frac{\text{No. of moles of solute}}{\text{Volume of solution (dm}^3\text{)}}$$

or

$$\text{Molarity (M)} = \frac{\text{Mass of solute (g)}}{(\text{Molar mass of solute g mol}^{-1}) \times (\text{Volume of solution dm}^3)}$$

Preparation of Molar Solution:

One Molar solution is prepared by dissolving 1 mole (molar mass) of the solute in sufficient amount of water to make the total volume of the solution up to 1 dm^3 in a measuring flask. For example, 1 M solution of NaOH is prepared by dissolving 40 g of NaOH in sufficient water to make the total volume 1 dm^3 .